NIHR | Collaboration for Leadership in Applied Health Research and Care West Midlands

Annual Report Year 5

April 2018 – March 2019

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CLAHRC WM in Numbers

£19,050,096 External Funding

£1,715,018 Expenditure

121 Publications

116 Projects

41 Students

13 Advisors

81 Staff

25 News Blogs

683 Subscribers

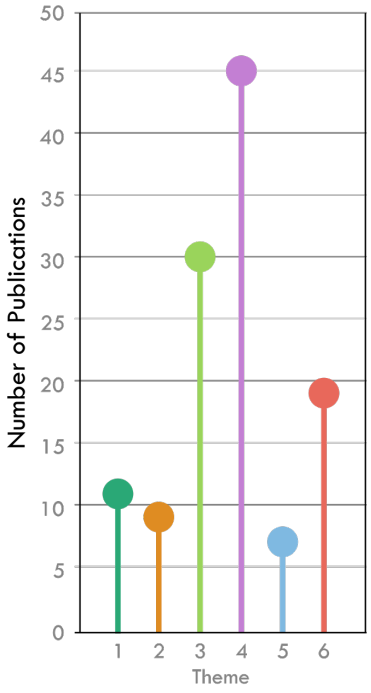
37 Tweets

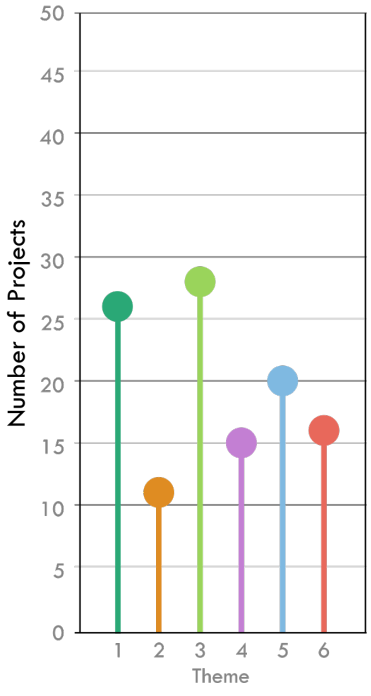
127 Likes

1,966 Twitter Followers

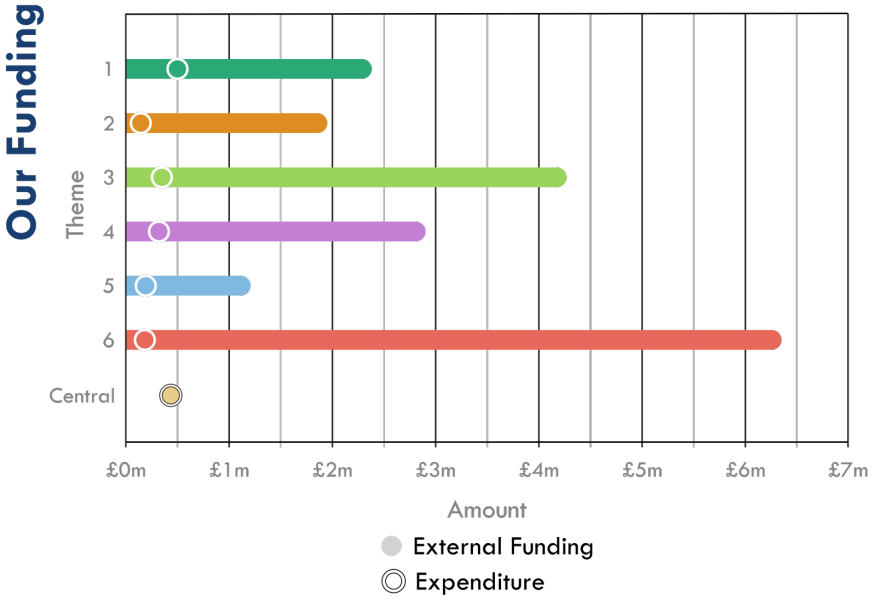
39,681 Twitter Impressions

Our Outputs





Our Funding



Our Team

NIHR Associates
NIHR Investigators
NIHR Trainees
PPI Advisors

Overview of Activities

Overview of Activities:

NIHR CLAHRC West Midlands has had another productive year, continuing to deliver across a range of research projects, and widening engagement with stakeholders from the NHS, public health, social care and beyond, in order to generate a strong bid for an NIHR Applied Research Collaboration (ARC).

Short-term objectives to identify and develop projects:

We have undertaken significant engagement activities with new and existing partners as a result of the ARC application (see also page 39) in order to identify and develop potential new projects. This has been immensely valuable in challenging our methodologies, ideas and research topics. We have undertaken the testing of these new research ideas, taking soundings from service providers and patients as to what they want us to research and how. We believe our ARC application has captured these priorities and hope to be able to work further with our wide range of stakeholders to develop these projects for the region and beyond. Our continued strong performance on both grant applications (see our progress in each theme, pages 8-35) and external grant income demonstrates that the projects we have identified continue to be developed to leverage further funding.

Medium-term objectives to evaluate:

Our evaluations of Learning from Excellence (LfE) and the Safer Provision And Care Excellence (SPACE) programme, which has just been completed, are good examples of innovative and responsive evaluations answering to service need, and of working in partnership with the West Midlands Academic Health Science Network (WMAHSN) and with wider partners (see also top achievement 3, page 6). We have produced a range of systematic reviews and technology reviews for the National Institute for Health and Clinical Excellence (NICE). Further, the recognition the BUMPES trial has received (page 10), along with our contribution to several NIHR signals and themed reviews, highlights the quality of the research we produce.

Our development of 'rapid response research' (page 34) and the CONSORT extension for Stepped Wedge Cluster Randomised Trials (see also top achievements 1 and 2, pages 5-6) demonstrates that we are evaluating topics of importance to health and social care partners, as well as working to develop novel methodological approaches that allow academic and scientific rigour to be applied in a manner and time frame that can be pragmatically adopted by busy and dynamic care organisations.

Long-term objectives to lead:

A number of our projects are having national and international impact in shaping policy or through local adoption at scale. Our leadership on the 0-25 Youth Mental Health model has seen an impact on policy through the NHS Long Term Plan (page 17); our work on absorptive capacity with NHS Rightcare has seen significant national uptake (page 28); the use of Statistical Process Control charts continues to increase, both locally and nationally, driven by NHS Improvement and underpinned and supported by our research (page 35). Our shared post with NIHR CLAHRC East Midlands, embedded within our host NHS organisation, University Hospitals Birmingham NHS Foundation Trust (UHB), is allowing us to conduct novel and informative database studies, in keeping with our 'rapid response' approach on projects. We hope that this model and its outputs will be informative at a national level.

Strategic Changes:

There have been no significant changes to strategy. We have seen considerable output from our strategy outlined in our original CLAHRC WM bid to develop a pipeline of ideas between CLAHRC WM and the WMAHSN where they act as an amplifying force for evidence we generate. This has culminated in the development of a 'patient safety service' offering for the region and is included as one of our top three achievements for this year (page 6).

We have recently reviewed our industry strategy (see page 43) and although it has previously served us well, we intend to refresh this in light of new operational and strategic drivers should we be successful in our bid to host an NIHR ARC. We have developed links that would allow us to transition seamlessly to a future ARC, such as increasing our engagement with capacity building for Nurses, Midwives, Allied Health Professionals, Pharmacists, and healthcare Scientists (NMAHPPS) (see pages 33 and 39) and the development of rapid response research projects (see top achievement 1, page 5 and our case study, page 34).

Forward Look:

Should our ARC application be successful we look forward to building further on our relationship with WMAHSN as they embed their new management structure through 2019. The additional engagement opportunities afforded by the Patient Safety Service of the WMAHSN will bring new contacts with organisations, as well as new research and evaluation opportunities (see also top achievement 3, page 6).

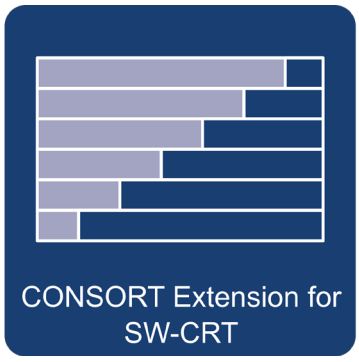
We are in the process of looking at skill gaps around data analysis and digital technology that we believe are inhibiting the uptake of digital solutions in the NHS and restricting the opportunity for economic development. To this end, we are developing a programme in partnership with WMAHSN to develop capacity among NHS staff and accelerate the uptake of digital interventions within the West Midlands.

As part of the CLAHRC WM legacy we plan to hold a number of theme-specific and general wrap-up and dissemination events across the West Midlands, engaging with as many of our stakeholders as possible. We also hope to trial some of our proposed future work programmes at these events.

Leadership Governance and Management:

There have been no significant changes within our governance and management during 2018/19. We took a strategic decision not to hold an International Scientific Advisory Committee this year, as it usually takes place in June, which was a key period of engagement and writing for us around our application for an NIHR ARC. Instead we utilised our panel of international experts remotely to discuss, review and advise on our application, which proved valuable in helping to formulate our plans and strategy.

Our leadership team has remained unchanged and this mature structure is helpful with regard to organisational resilience, contacts with health and social care providers and project delivery. Notably our Director Professor Richard Lilford collected his Companion of the British Empire (CBE) for services to health research at Buckingham Palace in May 2018.



Top Achievements:

1. The Development of Rapid Response Research

Through our engagement with professional services firms (see page 43) we were able to identify a significant gap for health and social care organisations around projects that have operational or policy imperative, but for which evaluation would be valuable in order to understand or optimise the intervention. Often this cannot be met through traditional research due to the constraints of personnel, ethics applications and/or data sharing. However, we recognise the utility and value this could bring and have therefore worked with local NHS providers to develop several 'rapid response research' projects during 2018/19. Most notably this has included a project to increase the uptake of the annual flu vaccine by front line NHS staff using behavioural science at our host Trust UHB. Having been approached initially about the project in April 2018, we had published a protocol and obtained ethical approval by August, randomised over 8,000 staff to four intervention arms in September, and delivered the intervention in conjunction with our NHS partner from October to December. We then locked the data in early January 2019, analysed it through an embedded health informatics post at the Trust by the end of January, and had a paper written for submission by the end of February.

This ability to respond to service need whilst still ensuring academic rigour is, we believe, exactly what CLAHRCs should be able to do to help pave the way for wider implementation studies or leveraged grant applications. Key to our success in delivering this project have been embedded posts, in particular having a CLAHRC analyst (jointly funded with CLAHRC East Midlands) within the Health Informatics team at our host Trust. This meant that data could be analysed to academic standards without the data needing to first be anonymised for use outside of the Trust, which inevitably incurs significant delay. We have further tested this model of working through a rapid response patient safety project around falls for inpatients at University Hospitals Coventry and Warwickshire Trust; and in partnership with the Work and Health Unit, a subsidiary of the Department for Work and Pensions, where we have developed a study looking at workplace health with over 120 regional Small and Medium-sized Enterprises.

Our work demonstrates the effectiveness of embedding posts within cross-CLAHRC collaborations in order to create employment continuity and to build capacity in a way that has benefited both CLAHRCs. Resources are thus optimised to provide excellent value for money while simultaneously maximising the dissemination of the research findings. As the model has particular appeal for the services, it is important that local

Trusts are seen to espouse and benefit from the new methodology, alongside formalising its academic reputation. This model is proving so successful that we hope to expand our capacity to deliver this work through the expansion of our shared posts at UHB to accelerate further future trials (see also page 34).

2. *The CONSORT Extension for Stepped Wedge Cluster Randomised Trials*

Our paper in the British Medical Journal on the Consolidated Standards of Reporting Trials (CONSORT) extension for Stepped Wedge Cluster Randomised Trials (SW-CRTs) has been one of the highlights of this reporting year.[109] We consider ourselves to perhaps be the leading international group on stepped wedge trial design. This methodology is becoming increasingly popular within health service delivery interventions, with the fundamental appeal being that all clusters ultimately receive the intervention at a pre-determined switch-over from the control condition to intervention condition. This is clearly attractive and very useful in health service interventions as it ensures that all groups receive the intervention (where it might otherwise be considered unethical not to offer it), and helps to increase the appeal of the study as all groups benefit. This is precisely the type of pragmatic, service-led methodology that we believe will form the basis of future research programmes. Although at the time of publication, only around 40 completed SW-CRTs had been published, there are around 80 published protocols and over 100 studies on the three main registries listed as 'ongoing'. We anticipate this will increase exponentially in coming years.

Systematic reviews of completed studies have revealed poor reporting of key features of SW-CRTs, making assessment of the findings problematic and not always reliable. In addition, while there are benefits to using SW-CRTs, the practical, service-oriented focus on rapidly delivering improvements for patients poses an inherent risk that the procedure will be applied incorrectly or that corners might be cut amidst the pressure to deliver cost savings. Like many others, we regard the CONSORT statement as being tremendously important in ensuring trials are evidence-based and transparent, allowing interpretation and further analysis of findings by the wider academic and clinical community. CLAHRC-WM has a national reputation for methodological rigour and we view it as critically important that the emerging discipline of SW-CRTs should be effectively recorded and reported. We are in the unique position of having both the methodological expertise and practical experience of SW-CRTs to drive up standards before the use of this innovative design becomes widespread. We are accordingly delighted to be able to support this by offering the extension regarding SW-CRTs to ensure that this emerging approach is optimised from the outset as its uptake increases.

3. *Development of a 'Patient Safety Service' to the region through the West Midlands Academic Health Science Network (WMAHSN)*

From the outset of CLAHRC WM, it was our intention that the relationship with the WMAHSN should play to our mutual strengths, with CLAHRC WM generating knowledge, evidence and performing feasibility studies, and WMAHSN acting as amplifier to that signal in implementation. We are delighted that, under their new licence, the WMAHSN are offering a 'patient safety service' to their membership organisations across the six Sustainability and Transformation Partnerships (STP) and their associated health and social care delivery organisations in the NHS and Local Authorities. This service is underpinned by four work programmes, each informed by CLAHRC WM evaluation and evidence:

- Birmingham Symptom-specific Obstetric Triage System (BSOTS).
- Learning from Excellence (LfE) programme.
- Safer Provision And Care Excellence (SPACE) programme.
- The use of Statistical Process Control (SPC) chart methodology.

Some of these interventions emanated from CLAHRC WM and some from WMAHSN, again demonstrating this is a two-way process where sometimes a new intervention is academically developed, evidenced and implemented more widely, and at other times the services make changes that begin to be adopted, but where an evidence base to support wider and quicker implementation is needed. The selection of these topics has been determined by organisational need, and they correlate closely with the topics of research identified by the NHS and social care stakeholders we engaged with during development of our application for an NIHR ARC.

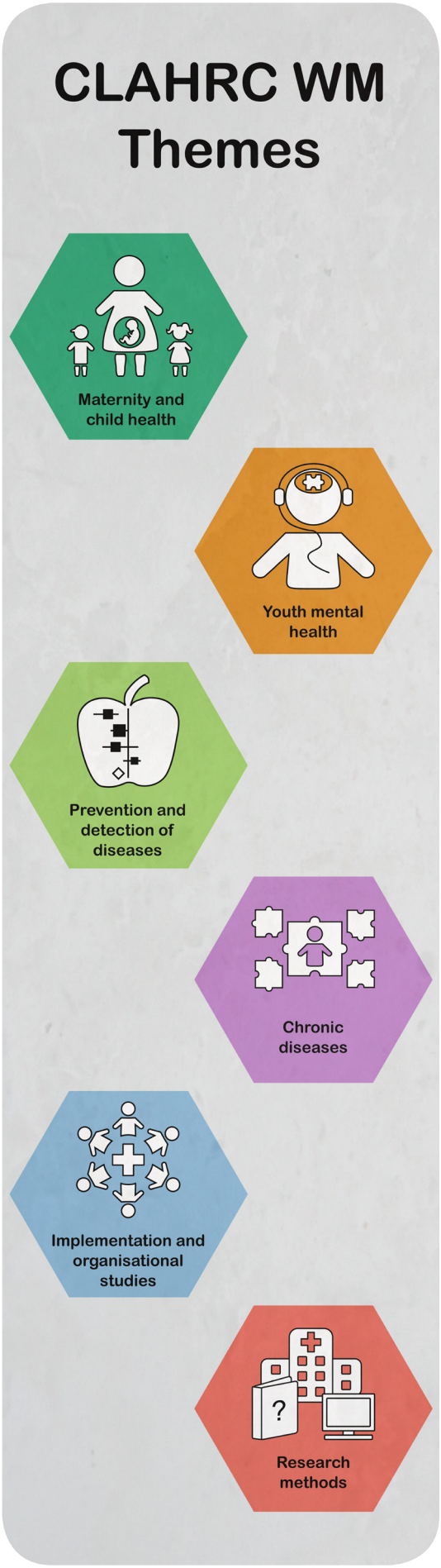
BSOTS (see page 10) has seen significant adoption during the last year following endorsement from the Royal College of Obstetrics and Gynaecology and the Royal College of Midwives. According to the NHS Litigation Authority, 10% of all claims in 2017/18 were within obstetrics, but this amounted to 48% of the value of all claims. The ability to risk stratify and standardise care for this group of patients who often have 'hidden' symptoms is therefore hugely attractive to the NHS. Nineteen Trusts have, or are in the process of, implementing BSOTS, with a further 20 interested. This level of implementation is beyond what CLAHRC WM could sustain alone, so the assistance of the WMAHSN in continuing and accelerating this national and international uptake is crucial.

The **LfE programme** of Appreciative Inquiry-backed positive incidence reporting continues to expand. During 2018/19 we published our research report on the programme, which was launched along with a poster presentation at the second Learning from Excellence conference in Birmingham. This event attracted 350 international delegates, and as a result of this we are helping international groups with adoption and implementation of LfE. Our researcher who undertook the field work for the project has been successful in applying for PhD funding to study the application of Appreciative Inquiry techniques, which underpin the LfE approach, in low- and middle-income countries. The clinical team have successfully obtained further funding from the Health Foundation to study implementation in a further nine hospital sites. As a result of the programme, the LfE team were invited to be the first health-related team to deliver a keynote presentation at the World Appreciative Inquiry Conference in France in March 2019.

The **SPACE programme** has been running across 32 care homes in the West Midlands for nearly two years, and our evaluation of the programme is nearing completion. It has sought to improve patient safety through training staff in identifying and reducing harm through quality improvement techniques. The programme has attracted considerable interest both regionally and nationally (including from NHS England) and we anticipate the final report in April 2019 will evidence the improvements to allow adoption to accelerate. Both this and the LfE programme now form a key part of the patient safety service WMAHSN offer to health and social care within the West Midlands.

We have continued to work in partnership with NHS Improvement around the implementation of **SPC charts** by hospitals (see page 35). We have held two workshops in 2019 (with a further two planned), training over 100 middle and senior managers within the region in data analysis and SPC chart methodology, as well as providing them with materials to sustain and embed their use within their organisations. We are working with the networks of the WMAHSN to identify further organisations interested in adopting this methodology.

These interventions have developed, or are developing, an evidence base that is making them attractive to health and social care organisations. Projects have been initiated by both CLAHRC WM and WMAHSN, but we now have a package of locally developed, evidenced-based interventions that the WMAHSN can implement.



Theme 1: Maternity and Child Health

Lead: Prof Christine MacArthur
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11
Papers

26
Projects

£2,387,494
External funding

£504.027
Expenditure

Research Highlights:

The outcome of the RESPITE randomised controlled trial [11] was published as an NIHR Signal and has also been put forward as an NIHR Highlight (see also page 12).

The BUMPES randomised controlled trial (BMJ 2017; 359: j4471) won the '*2018 UK Research Paper of the Year*' in the BMJ awards, and was also included in an NIHR Highlight.

Implementation Highlights:

Substantial progress has been made in the roll-out of the Birmingham Symptom-specific Obstetric Triage System (BSOTS). It received endorsements from both the Royal College of Obstetrics and Gynaecologists, and the Royal College of Midwives, generating national and international interest in its adoption. Currently seven maternity units have implemented the model, while a further 12 have received training and are in the process of implementation. In addition five units are booked on training courses, and 15 more have expressed an interest. As the demand has increased, sessions to 'train the trainers' are now being provided. Licensing agreements are already in place in Australia, with interest from two maternity units in New Zealand also. BSOTS has also been nominated in the '*Patient Safety*' category of the 2019 Meridian Awards.

Midwives Workforce Survey questions have been widely adopted by NHS Trusts around the country.

Strategy Initiated, New Activity and Major Grants:

There has been further development and roll-out of the successful BSOTS, including closer working with

AHSNs to facilitate dissemination of the model, as the level of implementation required significantly exceeds that which we would be able to support. In particular the WMAHSN have adopted the system into their Patient Safety Service (see also top achievement 3, page 6).

A package for e-learning for HealthCare has been developed to widen the implementation of the successful Place of Birth (POB) Discussion intervention. This is a low-cost, simple and highly effective mechanism to provide choice for pregnant women.

We have been focusing on the implementation of Maternity Hub models as integrated, streamlined care to improve both the experience of maternity services for pregnant women and the safety of the service.

We were successfully awarded an NIHR HTA grant (pending Board confirmation) to undertake a trial to evaluate the effect various dose regimens of oxytocin has on rates of caesarean section.

We are collaborating on the National Perinatal Mortality Review Tool to develop and implement a tool to support the standardised review of perinatal death. This is funded by the Healthcare Quality Improvement Partnership on behalf of the Department of Health and Social Care (England), NHS Wales and the Scottish Government.

Examples of Impacts on Health & Wealth:

The Midwives Research Forum met in January 2019 and has maintained good attendance rates and positive evaluation by midwives.

Nineteen licensing agreements have currently been signed for BSOTS, with more planned.

The BSOTS system has a significant impact on patients as it risk-stratifies a patient group who are often assessed and treated in diverse ways, and offers more standardised assessment process. This is particularly helpful for such a high-risk and high litigation area, such as obstetrics.

Our '*Yoga for Bump*' sessions have been highly successful in connecting researchers with a population normally difficult to reach and engaging their interest.

We have developed links with local groups in children's centres in Birmingham and Sutton Coldfield, connecting academics with communities not used to engaging with research.

A recent report from Charity Birthrights (August 2018), concerning treatment of women requesting caesarean section, highlighted our redesigned request pathway as an exemplar of good practice.

The impact of the Obstetric Anal Sphincter Injury Service (OASIS) continues to grow, and provides a valuable contribution to women's health through mitigating long-term consequences and subsequent higher healthcare costs of perineal trauma. Sara Webb, the lead midwife who was supported by CLAHRC WM, became one of the first to be made a Fellow of the Royal College of Midwives.

Progress, achievements and challenges against objectives:

Short-term:

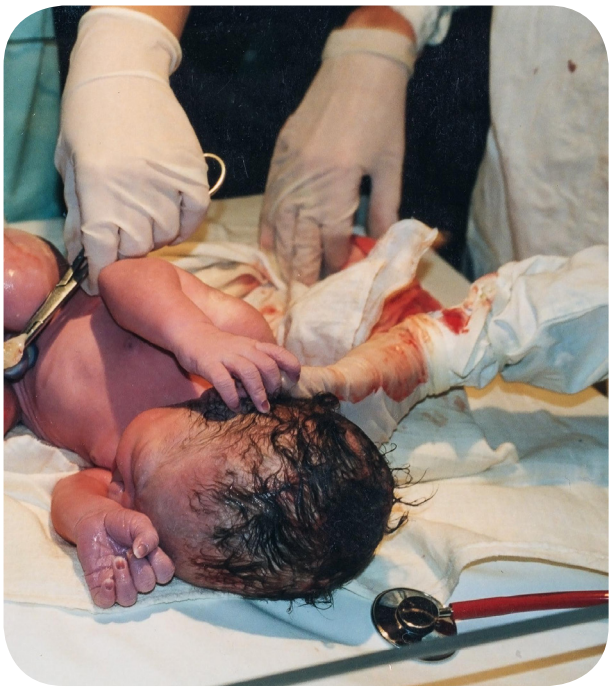
- Currently rolling out (spring 2019) an interactive electronic version of BSOTS, developed in collaboration with Clevermed.
- Completed programmes to support the training of midwives and the POB Discussion
- Held focus groups exploring views of community midwives on earlier discharge and postnatal care. Data for second phase of evaluation is now complete.
- Completed Phase 2 of the Magnolia House evaluation.

Medium-term:

- Collaborated with the AHSN network to support implementation of BSOTS across the UK more broadly.
- Data collection of final BUMP Phase 3 underway, with report expected in summer 2019.
- The findings from the Midwives Workforce Survey have been submitted for peer-review publication.

Long-term:

- We have submitted an application to the MRC for funding to introduce standardised clinical assessment for women who attend maternity services in the developing world.
- Dr Beck Taylor has submitted an application for an NIHR Fellowship.
- The end-of-study dissemination event for the Child and Young Person's Advance Care Plan (CYP-ACP) is in development.



Case Study: Pain Relief in Labour

The findings of the RESPITE trial were published this year in the Lancet,[11] comparing intravenous remifentanil patient-controlled analgesia with intra-muscular pethidine for pain relief in labour. This was a randomised control trial across 14 maternity units in the UK, with over 400 women recruited. The trial also resulted in publication of an NIHR Signal.

Good pain control is an important part of a positive birth experience for women, and intra-muscular pethidine has been the standard choice for pain control internationally for many years. It is estimated that more than a quarter of a million women in the UK receive the drug each year. However, the drug is not always effective in relieving pain, and can have side effects for both mother and baby. Epidural pain relief (drugs delivered into the spine) is more effective and has high patient satisfaction, but again can have side effects such as prolonging labour and a higher chance of instrumental delivery, such as the use of forceps.

Remifentanil is a fast-acting, short duration form of pain relief that can be controlled by the patient – known as Patient Controlled Analgesia (PCA). While a Cochrane Systematic Review in 2017 highlighted potential benefits to using remifentanil, it also noted there was a lack of evidence. The RESPITE trial therefore sought to address this issue. We found that 19% of women given remifentanil during labour went on to request an epidural, compared with 41% of those who were initially given pethidine. Women given remifentanil also reported lower pain scores and higher patient satisfaction, primarily as they were in control of their pain relief administration. There was no difference between the two drugs in the number of caesarean section operations conducted, or in the number of babies requiring resuscitation. However, more women who used remifentanil required supplemental oxygen (14% versus 5% with pethidine).

The implications for service are important. One of the barriers to remifentanil use has been the use of patient-controlled pumps to administer the drug as there is an initial cost associated with their purchase. However, we have now demonstrated that there is an evidence-base to support remifentanil as being more effective than pethidine. In addition, reducing the use of epidurals means there is a reduction in anaesthetist time, which is a costly and constrained resource. So a business case for introducing remifentanil will be much easier to make for maternity units. The increased patient satisfaction, linked to greater individual control, will also enable more individuals to have a positive experience of labour, which in turn may reduce complaints in an area of the NHS known for its high levels of litigation. Although the findings are too recent to have been incorporated in to national guidance (NICE guidelines were reviewed in 2017) we understand that local guidance is already changing. We anticipate that as a result of an adequately-powered, randomised controlled trial, there will be a significant increase in remifentanil use over the coming months and years.

Theme 2: Youth Mental Health

Lead: Prof Max Birchwood
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9
Papers

11
Projects

£1,933,546
External funding

£158,436
Expenditure

Research Highlights:

After working with Forward Thinking Birmingham and two GP surgeries in Birmingham, we completed data collection on the management of eating disorders at each stage of the referral pathway, and presented our findings to clinical staff.

We published a paper in Medicine and Psychiatry on 'Overlaps and Disjunctures: A Cultural Case Study of a British Indian Young Woman's Experiences of Bulimia Nervosa'.[14]

Our youth mental health research has been disseminated with school leaders.

Implementation Highlights:

Dissemination of our research highlights on early intervention in youth mental health has resulted in greater engagement and partnership working within the West Midlands for youth mental health in schools. This work was conducted in collaboration with schools, the Department of Public Health and Coventry City Council.

The implementation of (5-year) routine measurement of emotional wellbeing in young people in schools in Coventry.

Our work on the creation of the 0-25 youth mental health model in Birmingham was referenced and promoted in the NHS Long-Term Plan.

Prof. Birchwood is working with Kathryn Pugh (Children and Young People's Mental Health Programme Lead, NHS England) and colleagues on developing a national network for early adopters and interested parties of our 0-25 youth mental health model. Implementation is being driven by the Healthy London Partnership and the NHS Long-Term Plan.

Strategy Initiated, New Activity and Major Grants:

Development of collaborative relationships with secondary schools in Birmingham & Coventry.

Designing and developing a 'SchoolSpace' digital platform with 'e-Sterling' for the collection of emotional wellbeing data in school settings.

Collaboration with Birmingham Children's Hospital and the University of Birmingham to explore the experience and care pathway of children and young people with self-harm and suicidal behaviour.

The new NIHR Global Health Award (£2 million) brings our research on psychosis detection and management to bear on the challenges for early psychosis detection and management in India.

Partners in Parenting Trial (PiP) is a £1.2 million award funded by NIHR Public Health, replicating the Monash University PiP Trial, an online parenting intervention to support parents of children and young people with depression and anxiety.

Examples of Impact on Health & Wealth:

Collaboration and partnership working with Coventry City Council and the Department of Public Health on the emotional wellbeing of young people in schools.

National implementation of 0-25 youth mental health services in conjunction with NHS England seeks to evaluate the ways our model has been implemented nationally in order to improve understanding of the underpinning resources and how best to commission the service and open up access to more patients.

Progress, achievements and challenges against objectives:

Short-Term:

- Established a Centre for Mental Health Research and Wellbeing to act as the engine of public mental health innovation in the West Midlands.
- Completed a screening trial of early warning signs of eating disorders in young people in schools.
- Completed a systematic review of school-based self-harm interventions for primary aged children.
- Established a working collaboration with Coventry City Council and the Department of Public Health.
- Developed a SchoolSpace digital platform in collaboration with local schools and partners at Monash University, Australia.

Medium-Term:

- Applied to conduct a pilot study to develop the work of The Long term conditions, Young people and Network Communication (LYNC) study.
- Our PhD student has successfully completed her PhD, researching resilience during transition from primary to secondary school.
- A care pathway analysis of eating disorder care pathways has been completed, in collaboration with Forward Thinking Birmingham and two GP surgeries in Birmingham and Solihull.

Long-Term:

- Discussion continues regarding development of a primary care-based system, using a Mindfulness App, to transform the delivery of care for young people at risk of depression.

- Ongoing discussion and collaboration with partner organisations (Coventry City Council, the Department of Public Health, Educational Leaders & Birmingham Education Partnership) in West Midlands regarding implementation of school-based screening for emerging mental health problems and online interventions in Birmingham and Coventry.

Case Study: 0-25 Youth Mental Health

When we reported on the 0-25 Youth Mental Health in 2016-17, the new Forward Thinking Birmingham (FTB) 0-25 service had recently launched. The model has now spread to seven areas of England, with many more adopting elements of the model, or considering full adoption. Our evaluation proved valuable, both in terms of refining the model and service in Birmingham, but also in providing implementation help for future adoption sites.

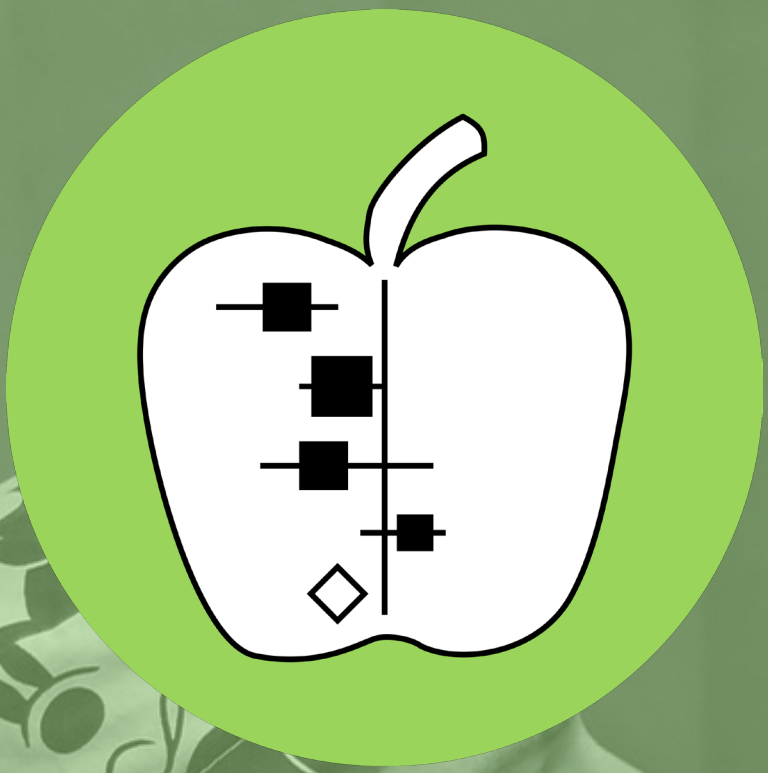
The West Midlands Combined Authority made mental health one of their priorities and set up a mental health commission for the region, chaired by Rt Hon Norman Lamb MP and including CLAHRC WM academics. The Directors of Public Health for the West Midlands have jointly agreed mental health in school children as one of their four priority areas for 2019/20, demonstrating how embedded improving youth mental health has become within acute and public health, and social care.

Academics from both this theme and our cross-cutting Implementation and Organisational Science theme (5) presented to the Cabinet Office in 2017, which helped inform the Green Paper published the same year. The NHS Long Term Plan, published in January 2019, reconfirmed this support for the preventative, early intervention work (including through digital platforms, such as Schoolspace). It also pledged support for eating disorders, an area that has seen significant improvements as part of the FTB model. The Plan stated: "*The structure of mental health services often creates gaps for young people undergoing the transition from children and young people's mental health services to appropriate support including adult mental health services. We will extend current service models to create a comprehensive offer for 0-25 year olds that reaches across mental health services for children, young people and adults*" (p 51).

The Plan also noted: "*Selectively moving to a '0-25 years' service will improve children's experience of care, outcomes and of continuity of care"* (p 55) and that: *"By 2028 we aim to move towards service models for young people that offer person-centred and age appropriate care for mental and physical health needs, rather than an arbitrary transition to adult services based on age not need*."

Recognition of the model's importance in the overarching strategic policy document for the next ten years is hugely important in driving further adoption.

NHS England have recognised the value of the 0-25 model, as well as the considerable support required to implement it, and have created a national network for early adopters and contemplators. Within CLAHRC WM we have always recognised there is a high bar to implementation of the model, as it requires considerable commissioning redesign. This network is therefore very welcome and our academics are working to support it, alongside other CLAHRCs. By drawing together this expertise, and with evidence from areas implementing the model, we hope to further develop and spread the 0-25 approach, delivering on the strategic vision now captured within the NHS Long Term Plan.



Theme 3: Prevention and Detection of Diseases

Lead: Prof Aileen Clarke
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30
Papers

28
Projects

£4,281,012
External funding

£362,822
Expenditure

Research Highlights:

Six systematic reviews have been completed during 2018/19.[24, 34, 38, 40, 47, 48]

We completed an influential analysis of the use of tonsillectomy in the UK over a 12-year period, finding the vast majority of children who underwent surgery were unlikely to benefit.[43] This study was selected as one of the top ten papers of the year by the British Journal of General Practice, and was reported in over 120 pieces of media, including the front page of the Guardian newspaper.

Our researchers published a process evaluation of a cluster RCT instigating barriers and facilitators to the use of a software reminder system to increase use of anticoagulants in atrial fibrillation [*Br J Gen Pract 2018; 68 (677): e844-e851*].

We published an analysis of long-term trends in mortality after a diagnosis of heart failure.[44]

Implementation Highlights:

Our review of Non-Invasive Prenatal Testing for trisomies [*BMJ Open 2016;6:e010002*] led to commissioning for national roll-out of the test, and this is predicted to decrease the number of miscarriages associated with invasive tests. Extension work has helped to define the English commissioning process.

Research we carried out on food placement in shops led to product rearrangement in the University of Warwick campus grocery store.[50] The research has been presented at national conferences, including the Food Matters Live conference in November 2018, and contributed to a Public Health England report, "*Improving the hospital food environment: helping NHS staff and visitors make healthier purchases*."

We have successfully transferred the food choice architecture interventions research to local primary and secondary schools to improve healthy eating choices in these environments.

Strategy Initiated, New Activity and Major Grants:

We have initiated National Screening Committee (NSC) projects relating to newborn screening and we have undertaken a high-profile review of whether the UK should screen for diabetes.

Our team are developing various proposals, including ones related to healthy life expectancy, cardiovascular disease prevention in primary care, continuity in primary care, and multimorbidity in low- and middle-income countries.

As CLAHRC WM concludes, we are building a web presence for the Warwick Screening Group to reinforce its legacy.

We were awarded £209K from the NSC to undertake a variety of evidence synthesis reviews.

We received £2 million from the NIHR to undertake the SMALL trial, addressing over-treatment of small screen detected breast cancer. In addition we received NIHR awards totalling £809,431 to undertake other reviews.

Prof. Tom Marshall has been awarded £385K to investigate clustering in multi-morbidity, in collaboration with the University of Cambridge.

Prof. Kate Jolly has been awarded £2.1 million by NIHR for research into 'Snacktivity', promoting physical activity in on order to reduce the future risk of disease in the population.

Prof. Aileen Clarke is a co-applicant on a HTA-funded cardiovascular network meta-analysis project that aims to assess relative effectiveness of all cardiovascular primary prevention initiatives.

Prof. Kate Jolly also received an award of £700k to conduct a randomised pilot trial for Enhancing the Health of NHS Staff through an employee health screening clinic (eTHOS study).

Examples of Impacts on Health & Wealth:

We carried out a feasibility study of the Healthy Dads, Healthy Kids programme (NIHR 14/185/13), which was a cultural adaptation of a successful trial in Australia. Although the intervention was well delivered and received, recruitment and follow-up was very challenging. It was determined that insufficient public health infrastructure was in place in the UK, and so the challenge of delivering the intervention was too great for further research to be viable. Without our evaluation this programme may have been rolled out nationally at significant expense with limited impact.

Researchers from our Theme have continued working with the West Midlands Combined Authority with an evidence briefing on the effectiveness of emotional resilience interventions in improving health outcomes in children.

Prof. Tom Marshall's work showing that tonsillectomies are often performed unnecessarily, [43] will inform service provision, ensuring the right patients benefit from the procedure, and will reduce unnecessary spending on this form of treatment. Further, NHS England have indicated an intention to limit tonsillectomies and it is therefore likely that this research will form part of the review process.

The findings from our evaluation of weight management interventions have been disseminated through a number of publications, in order to inform healthcare providers regarding the efficacy of obesity treatments and food choice architecture.

The six projects commissioned by the NSC will have substantial impact across the UK in antenatal and postnatal screening.

Progress, achievements and challenges against objectives:

Short-term:

- We have completed the feasibility study of the Healthy Dads, Healthy Kids programme.
- Our goal to produce five systematic reviews over the past year has been surpassed, with seven reviews published.[24,29,34,38,42,47,48]

Medium-term:

- Completion of Healthy Dads, Healthy Kids programme.
- We achieved our objective to apply for funding for three major externally-funded RCTs (Warwick); while the Birmingham-based team have submitted research proposals to CRUK. Although this was unsuccessful, it has been resubmitted to Bloodwise.
- Work continues on a proposal to use electronic primary care records to estimate healthy life expectancy.

Long-term:

- We are developing a sustainability plan for research and implementation, securing funds for new projects.
- Research proposals are underway in clustering in multimorbidity; CVD prevention in primary care; use of information technology; and continuity of care in primary care.

Theme 4: Chronic Diseases

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Prof Christian Mallen
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45
Papers

15
Projects

£2,911,989
External funding

£317,097
Expenditure

Research Highlights:

Using our video consultations feasibility study we were able to develop a major grant application.

Together with renal clinicians at Keele University we have submitted an HS&DR application to look at factors enabling home therapy uptake.

We have been invited to submit a proposal to evaluate Baxter Healthcare's patient training model for renal patients going onto peritoneal dialysis.

The Renal Transitions study, part of the INTEGRATE international collaboration, is a spin-off from an early CLAHRC WM study. Data collection has finished in the UK and staff will now be working with the University of Brisbane, with a visit to collect data in June 2019.

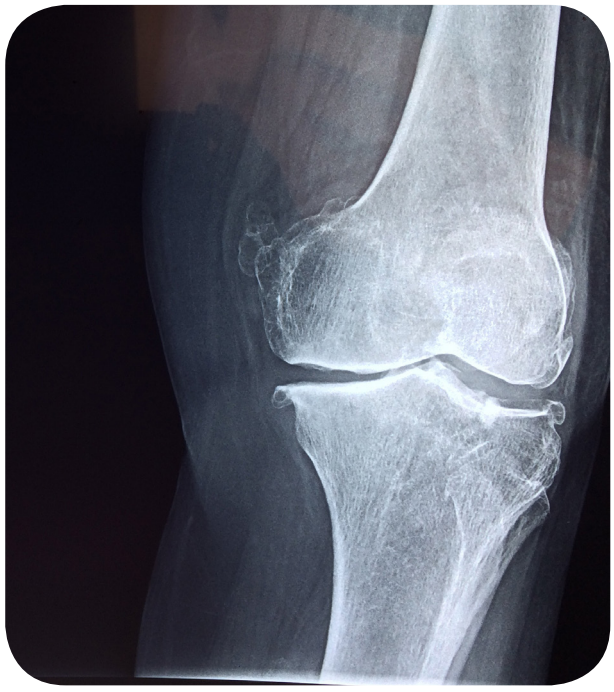
Implementation Highlights:

The renal study on emotional and psychological support for end-stage patients has been well-received, and has been strongly promoted through eight local and national CLAHRC events.

Development is ongoing with European partners on optimal models to support osteoarthritis care in community settings. This work has now expanded to involve community pharmacists.

Strategy Initiated, New Activity and Major Grants:

Held a feedback workshop with senior clinicians and managers from across the STP on Coventry's '*Out of Hospital Care Model*'.



Together with CLAHRC West, undertook an ethnographic study of delayed hospital discharges at the Queen Elizabeth Hospital Birmingham.

Developed an NIHR Programme grant to continue the work of INCLUDE (Integrating and improving Care for Patients with Inflammatory Rheumatological Disorders in the Community).

Developed an MRC submission to investigate disease clusters in those with multimorbidity.

Started an NIHR SPCR investigation of self-harm in people with musculoskeletal disorders (using the clinical practice research datalink).

The Keele team developed new partnerships with regional mental health trusts, including combined healthcare (one of only two mental health trusts receiving a CQC outstanding rating) and Midlands Partnership Foundation Trust supporting the development of mental health research activity

Awarded an £817,000 NIHR HS&DR grant on the role of the voluntary sector in supporting survivors of sexual violence.

Arthritis UK awarded £606,000 to Dr Clare Jinks, Keele, for a study in Increasing Physical Activity in Older People with Chronic Musculoskeletal Pain.

Researchers at Keele University obtained £1.65 million for an HTA study into the Provision of Braces to patients with Knee Osteoarthritis.

Awarded a £2.5 million grant at Keele University for an NIHR PGfAR investigating ways to reduce the burden of opioid medication.

Leadership:

Prof. Jon Glasby has not continued into the nine month extension of CLAHRC WM. Prof. Gill Combes now leads at the University of Birmingham and Prof. Christian Mallen at Keele University.

Examples of Impacts on Health & Wealth:

The new opioid reduction programme grant at Keele University received extensive media attention, including questions raised in parliament and direct contact from the health select committee, with numerous approaches from Clinical Commissioning Groups wanting to work with us on this programme.

The INSTINCT trial (carpal tunnel syndrome) was published in the special primary care edition of the Lancet.[60]

Progress, achievements and challenges against objectives:

Short-term:

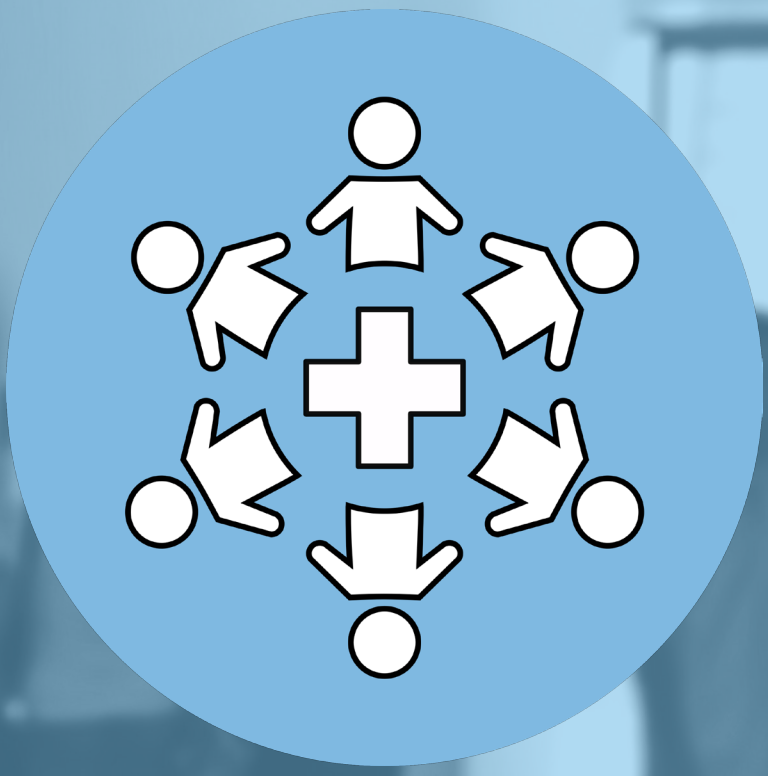
- WMPSC's Safer Provision and Care Excellence (SPACE) scheme has been written up and is ready for publication and dissemination. This study has attracted a lot of national interest. We are hopeful there will be compelling clinical improvements from the second year of the programme that will drive much wider and more rapid implementation of the scheme (in conjunction with WMAHSN) (see page 6).
- Development of a nurse-led integrated care review method for patients with inflammatory rheumatological conditions in primary care (INCLUDE study).

Medium-term:

- Data collection on the Supported Integrated Discharge (SID) collaboration between CLAHRC WM and Heart of England Foundation Trust is now complete and will form a CLAHRC-funded PhD.
- A feasibility study on the new UHB service of Video Outpatient Consultations is underway to assess if it can increase patient satisfaction and investigate its acceptability to patients and staff.
- The HECTOR study is finished and academic papers are in preparation.
- We will continue to follow-up participants and analyse results for the INCLUDE study.
- Conducting Clinical Practice Research Database studies that investigate the prevalence, incidence and comorbidities associated with a range of common chronic musculoskeletal disorders.

Long-term:

- Studies are underway on the prevalence of multimorbidity in people of later working age and the impact of multimorbidity definition on characteristics of the cohort.
- Applied for an NIHR Programme Grant for Applied Research to expand the INCLUDE study (November 2019).



Theme 5: Implementation & Organisational Studies

Lead: Prof Graeme Currie
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7
Papers

20
Projects

£1,205,613
External funding

£191,170
Expenditure

Research Highlights:

Published research in the BMC Health Services Research on the barriers to implementation of guidelines in the management of musculoskeletal disease in primary care.[98]

Carried out examination of how evidence and knowledge are used in orthopaedic decision-making.

Our research on the interactive identity work of professionals in management was accepted for publication in Public Management Review.

Completed a study looking at professional misconduct in health care, focusing on setting out a research agenda for work sociology.

Developed work on sharing leadership for diffusion of innovation in professionalised settings.

We have continued our work on Absorptive Capacity (ACAP), resulting in a paper published in Health Services Delivery and Research [*2018; 6(12)*] based on our paper in Social Science and Medicine [*2016; 192: 124-32*].

Implementation Highlights:

Implementation of 'family hubs' at Coventry City Council, which provide early intervention across domains, including health visiting, for at-risk families.

Evaluation of the NHS Partnership with Virginia Mason Institute continues, with the researchers working in real time to support implementation.

Continued development of a toolkit to allow organisations, such as Clinical Commissioning Groups, to benchmark their capabilities and capacities.

Ongoing work with Coventry City Council, using the toolkit, to evaluate the organisational development of 'family hubs' in Coventry.

Examples of Impacts on Health & Wealth:

Transferring the CLAHRC approach into translation, with an NIHR-funded initiative to develop early intervention around psychosis for youth mental health (NIHR Global Health Research Group on Psychosis Outcomes: The Warwick-India-Canada Network, £1.5 million).

Re-design of the leadership programme at University Hospitals Coventry and Warwickshire following our evaluation.

Research on whether GPs promoted self-directed exercises for musculoskeletal problems to their patients showed that a ready resource of suitable materials available would encourage their recommendation, potentially saving costs on treating this common and persistent ailment.

Roll-out of our ACAP self-assessment tool, in partnership with NHS Rightcare, has continued, and led to an Open Innovation event where our research findings were presented to the Cabinet Office.

Our existing partnership with GE Healthcare and Pfizer continues and the global health case challenge competition run by Warwick Business School was, again, a great success this year with a focus on atrial fibrillation.

Strategy Initiated, New Activity and Major Grants:

Commenced evaluation of the health and social impact of Coventry's City of Culture award.

Development of digital health care in response to NHS priorities.

Prof. Currie and Dr Kirkpatrick are working with Monash Medical School, Australia to extend the CLAHRC approach to translational research initiatives

Awarded £440k for a Policy Research Unit for Behavioural Science from NIHR Policy Research Programme.

In collaboration with West Midlands AHSN, £93,727 was awarded from NHS England for the implementation of a pilot fiscal incentive programme to improve employee wellbeing in 120 small to medium size enterprises (see also page 32).

Awarded £54,443 from ESRC for macroeconomic implications of the sampling brain to investigate the recent developments in cognitive science that have created new models of the moment-by-moment calculations by which people make decisions.

We are collaborating with Pfizer and IBM on an AI-based oncology project as part of our ongoing overarching relationship with them.

Our long term relationship with KPMG continues, with Prof. Currie meeting Mark Britnell, the Chairman and Senior Partner for Healthcare, to discuss how we can collaborate to address the workforce challenges identified by his recent book "*Human: solving the global workforce crisis in healthcare*".

Progress, achievements and challenges against objectives:

Short-term:

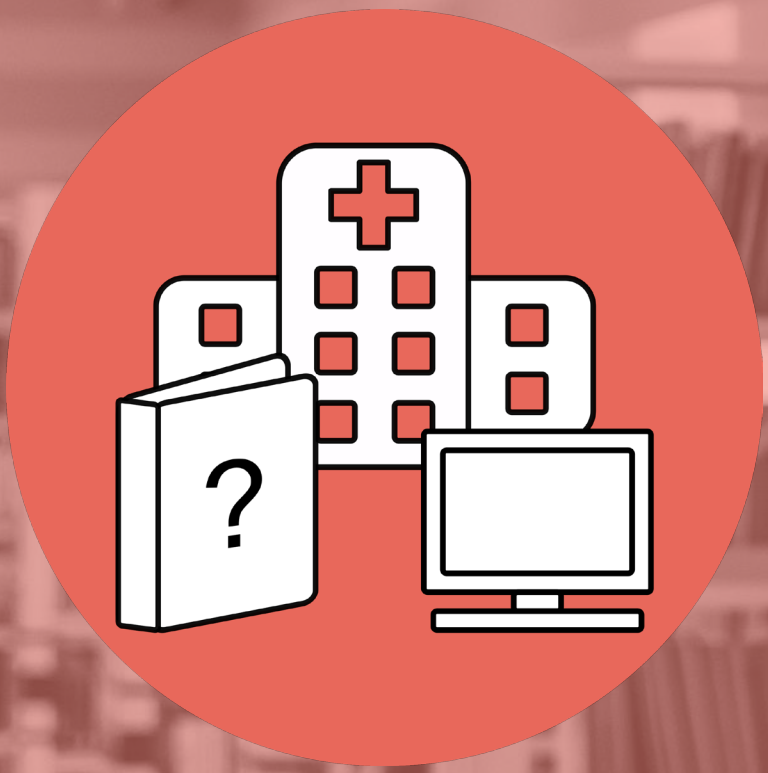
- Implementation Research Fellows from within our Theme continue to support the four main clinical themes with evaluation of clinical services.
- Nine PhD projects are underway, underpinned by the theoretical construct of 'absorptive capacity'.
- Analysis has been completed on exploration of the roles and experiences of PPI advisors, and a manuscript is currently under review.

Medium-term:

- A wide range of applied research studies have been identified in conjunction with NHS partners; 14 protocols have been generated and peer-reviewed, and fieldwork progresses well.
- We are using a model where our researchers and PhD students are embedded within NHS organisations, working alongside clinicians and managers to conduct research. Formative feedback arising from the implementation studies allow organisations to increase their ability to apply 'new' knowledge from research into routine practice in 'real-time'.

Long-term:

- The implementation of projects undertaken thus far will give the required level of coverage to assess the spread of absorptive capacity across the CLAHRC WM footprint and beyond.



Theme 6: Research Methods

Lead: Prof Richard Lilford
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19
Papers

16
Projects

£6,330,442
External funding

£181,466
Expenditure

Research Highlights:

In collaboration with CLAHRC East Midlands, we published a health informatics study into cardiovascular, cancer and mortality events after bariatric surgery in people with and without pre-existing diabetes.[105]

Our BMJ paper on the new CONSORT extension for stepped-wedge cluster randomised controlled trials protocol [109] is an example of cutting-edge methodology, which has been swiftly incorporated into a rigorous reporting standard, with the aim of ensuring that future trials of this nature will be consistently and systematically described (see also top achievement 2, page 6).

Publication in BMJ Quality and Safety of research into the 'weekend effect' (where patients admitted at this time are linked to higher mortality rates), showed that patients were also generally sicker than those admitted on weekdays, which may be linked to reduced community services at weekends.[117]

A long-term follow-up of multiple sclerosis patients showed that short-term drug therapy to alleviate symptoms continued to have positive benefits.[114]

Conducted a systematic review on ranking hospitals based on preventable hospital death rates.[112]

Implementation Highlights:

Training for middle and senior managers in the use and interpretation of Statistical Process Control Charts is proving an effective strategy to disseminate the benefits of this research (see page 35). This will continue across the region over the coming months, aided by WMAHSN (see also top achievement 3, page 6).

Examples of Impacts on Health & Wealth:

Working with WMAHSN, as part of their Digital Health West Midlands initiative, to create a programme of capacity development around analysis and digital skills to which CLAHRC WM researchers will contribute.

Workplace Wellbeing is a cluster randomised controlled trial evaluating the effectiveness of offering financial incentives to staff of small and medium enterprises (SMEs) in the West Midlands to invest in their health and wellbeing.

Successful application of "nudge" theory encouraging staff uptake of seasonal flu vaccine resulted in lower staff sickness and benefited patient care (see also page 34).

Strategy Initiated, New Activity and Major Grants:

Established the Clinical Decision Unit Research and Service Improvement Group (September 2018). This is an initiation to support research and staff capacity development for Nurses, Midwives, Allied Health Professions, Pharmacists, Psychologists and healthcare Scientists (NMAHPPS) in one of the busiest and most pressured units in UHB. It also has the dual aim of improving service efficiency and recruitment and retention of staff.

Development of 'rapid response research' as a method of producing high-quality analyses within a short time, in order to address service providers' needs to respond to demands or deficiencies within the health care system (see page 34)

Lead a Work Package (Economics) on a £2.4 million NIHR award for the Development and evaluation of a complex ePrescribing-based Antimicrobial Stewardship (ePAMS+) intervention for hospitals.

Awarded £220,000 for mobile consulting as an option for communities with minimal healthcare access in low-resource settings, supported by an MRC Health Systems Research Initiative Foundation Grant.

Awarded £392,000 for improving diagnosis of brain infections in Indonesia using novel and established molecular diagnostic tools from the MRC UK-Indonesia Joint Partnership Call on Infectious Diseases.

The British Academy awarded £50,000 from Knowledge Frontiers: International Interdisciplinary Research Projects to investigate climate-related health risks in urban slums, and the challenge of integrating local and scientific knowledge.

The Work and Health Innovation Fund from the Department for Work and Pensions awarded £497,000 for a Workplace Wellbeing Fiscal Incentive Trial, working with SMEs on staff wellbeing.

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Progress, achievements and challenges against objectives:

Short-term:

- Accelerating the production of studies through shared posts with CLAHRC East Midlands.
- Working with the Clinical Business Development Lead at UHB to develop a team that can respond to "rapid results" projects we generate.

Medium-term:

- Evolution of rapid response research (page 34) in parallel with regional and national NHS priorities.
- Continuing roll-out of use of control charts through a programme of training and dissemination to build momentum in the adoption of this important

and accessible aid for data analysis (page 35).

Long-term:

- Developing collaborations with public health and social care research leads to explore methodology links that will be applicable to these service areas.

Case Study: Clinical Decision Unit

The Clinical Decision Unit at University Hospitals Birmingham NHS Foundation Trust is the main admission unit for the hospital with 72 beds and other high dependency and clinic areas. Consequently, it is one of the most under pressure areas of the hospital, with staff constantly needing to innovate to deal with the level of demand and increasing complexity. Accordingly, it is also one the more challenging areas to recruit nursing staff to, as well as to retain them.

The Matron for the unit, together with an Acute Medicine consultant, decided that an increased focus on research and quality improvement would capitalise on the already impressive innovation in the area. By building capacity and capability amongst the Nurses, Midwives, Allied Health Professionals, Pharmacists and healthcare Scientists (NMAHPPS) on the unit they felt they could increase morale by helping to demonstrate improvement, and therefore increase recruitment and retention of staff. They approached CLAHRC WM to help support this development, along with other partners such as Health Education England, and we have since assisted with methodology and analysis for several improvement projects.

In one example, the creation of a dedicated discharge team cut the time from decision to discharge to the patient leaving the unit by 75%. Previously, the unit had either not generated formal research outputs, or had not submitted these. The unit has now had four posters accepted for the Society of Acute Medicine Annual Conference in May 2019. This can be seen as a really strong return on a small initial investment of expertise as the group has only been established for nine months.

We are now working collaboratively to create a training programme for the NMAHPPS on the unit to equip them to self-sustain these research and quality improvements. We will then aim to bridge staff with a relevant interest with formal programmes, such as the MRes programmes included as part of our NIHR ARC application, or schemes such as the Masters to Doctorate Bridging Programme. From there we hope they will be equipped to progress towards formal NIHR capacity building schemes, such as pre-doctoral and doctoral fellowships.

We have also begun discussion about using the area as a pilot site for implementing nudge interventions. Given that we have considerable expertise in this field within CLAHRC WM (through Warwick Business School), and we know that nudge has seen limited use in acute healthcare settings, we plan to explore opportunities to redesign elements of the choice architecture within the unit to improve patient care and potentially staff well-being.

Case Study: Rapid Response Research

Through our work with NHS partners, and our planned programme of work with professional services firms, we identified a gap in evaluative provision for the NHS. While Trusts value the rigour and theoretical grounding of formal academic studies provided through evaluation, the time-frames involved can sometimes be too long, especially as healthcare is such a dynamic environment. Speed of response is often the key factor in decision making, so Trusts are pushed towards either engaging professional services firms at high cost and (perceived) low quality, or not incorporating evaluation as part of important service changes.

We have worked to understand these barriers, and whilst not overcoming all (such as having a standing army of researchers free to respond are within our resource envelope), we have worked to overcome as many as feasible. Over the last 18 months we have thus begun to develop the idea of 'rapid response research', where we incorporate a range of new approaches and methodologies in order to deliver rigorous evaluation, whilst still adhering to the timetable of the intervention set out by our health and social care partners. This compressed time line allows it to be of use to the NHS. So far we have undertaken three rapid response research projects.

Perhaps our most notable example of this has been our randomised control trial of uptake of the annual flu vaccination programme by front line staff using behavioural science at our host NHS Trust, University Hospitals Birmingham NHS Foundation Trust. From initial contact to discuss the intervention, through ethics, three months' worth of intervention delivery across four trial arms to over 8,000 staff, data analysis and initial drafting of an academic paper took a total of nine months. We think that this model of trial delivery and evaluation is novel and it is proving extremely popular with our NHS stakeholders who see it very much as 'the best of both worlds' (see also top achievement 1, page 5).

We are necessarily limited by resource as to how many projects we can deliver at one time within this framework, but we are seeking to make the associated processes as efficient as possible. We are also exploring the potential to collaborate with other units and organisations to create a more responsive offer. This includes preliminary talks with a local Commissioning Support Unit who do have the capacity and capability to respond more quickly in the initial stages of a project (such as evidence synthesis or systematic review), while the slower stream activities (such as ethics approvals and trial design or randomisation) can be undertaken through CLAHRC WM. Rapid response research aims to be a key component of the cross-cutting theme (Research Methodology, Informatics and Rapid Response) in our proposed NIHR ARC, where we hope to further develop and spread this model.

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Case Study: Use of Statistical Process Control Charts

We featured a case study on control charts in our 2016-17 Annual Report, focussing primarily on our BMJ Quality and Safety paper, Health Service Journal article, and contact with Sam Riley, Head of improvement Analytics at NHS Improvement (NHSI).

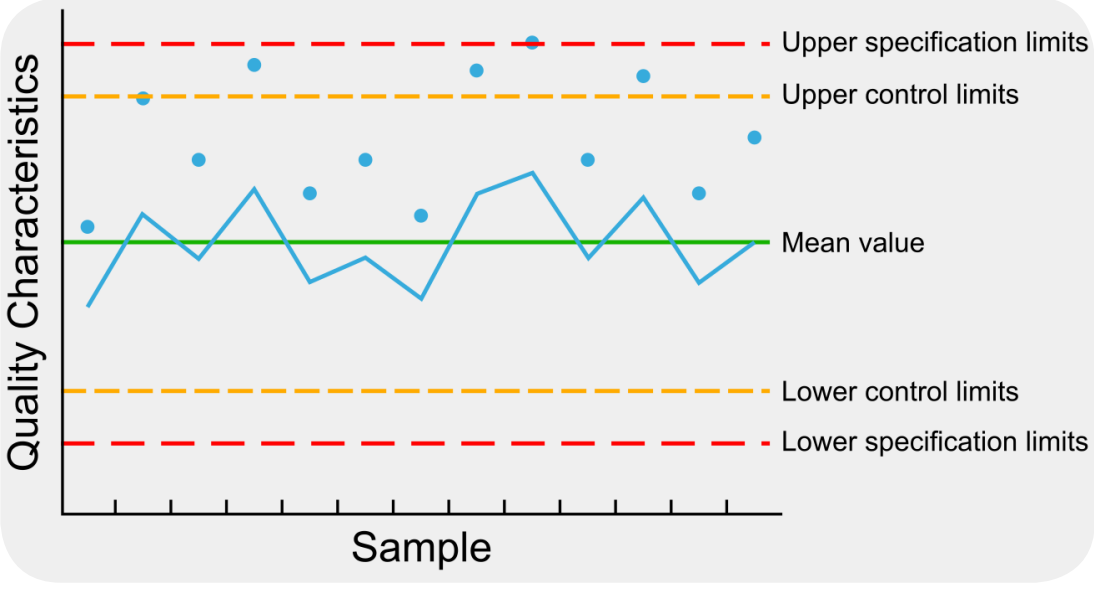
Since then we have made repeated efforts to engage local hospital Boards to adopt control chart methodology within their reporting processes without success. This included engaging with Chief Executives, presentations, and general lobbying. However, the launch of the '*Making Data Count*' publication and associated '*Plot the Dots*' initiative by NHSI has had great success in engaging Boards around the country by addressing some of the perceived implementation barriers highlighted in our 2016 publication. So far more than 50 Boards have been trained, and all have adopted control chart methodology within their reporting structures. A further 65 Boards are booked to be trained this year, meaning that 40% of NHS Boards will have been trained by the end of 2018-19. NHSI and CLAHRC WM will be jointly hosting a workshop on control charts in April 2019 with the aim of stimulating further interest in this methodology within the region.

Recognising that Boards are largely engaged with the end point of the process, we have widened our focus to include building capacity within senior and middle managers to embed control chart methodology more deeply within organisations. This is to try and ensure that, once Boards adopt control chart methodology, the organisation beneath them has the knowledge, capacity and capability to implement and embed control charts at all levels. The benefits of using such a framework to aid the interpretation of complex data has led to the inclusion of control chart methodology within a number of formal academic programmes, including the MSc Healthcare Policy and Management at the University of Birmingham; the Clinical Academic Internship Programme run by Health Education England; and the regional forum for the NHS Graduate Management Training Scheme.

The West Midlands Academic Health Science Network (WMAHSN) have incorporated workshops on control charts delivered by CLAHRC WM into their Patient Safety Service (see also top achievement 3, page 6) and into their Digital Health West Midlands programme that will launch in 2019. We have continued to run on-demand workshops for trusts with over 60 managers trained in 2018-19 and further sessions for 2019-20 planned. We believe this is a strong example of a simple, well-proven methodology that is easy to translate to different care settings. Evidence from studies shows it makes a significant difference to the understanding, and therefore decision making, hence our decision to target middle and senior managers, whilst NHSI targets executive and non-executive directors.

We continue to research the barriers to implementation for control charts, with a further mixed methods review underway, and future projects and funding under discussion. Our hope is to create exemplar projects within the region in partnership with the WMAHSN to drive further adoption.

Building on our work we are holding a dissemination workshop in conjunction with NHSI in April 2019. Statistical Process Control charts already form part of the Masters in Healthcare Policy and Management programme at the University of Birmingham, but this year will expand to be included as part of the Clinical Academic Internship Programme run by Health Education England; be added to the NHS Graduate Management Training Scheme in the West Midlands; and be offered as part of the Digital Health West Midlands programme offered by the WMAHSN. This is in addition to the 'on demand' training sessions requested by health and social care organisations, as mentioned above.



Patient and Public Involvement and Engagement

PPI/E Lead: Ms Magdalena Skrybant
m.t.skrybant@bham.ac.uk

13
Advisors

CLAHRC WM continues to deliver its PPI Strategy and there have been no significant changes or revisions. We have a unique approach to PPI/E: involving public contributors who are also involved in advising the service, thereby generating a group of people to champion our research and help ensure that evidence is used in practice. Our 13 public advisors are embedded in our research themes, and are supported by our full-time PPI/E Lead (Magdalena Skrybant), who ensures that involvement is aligned to NIHR INVOLVE Values and Principles Framework, and that the public voice is embedded in our research projects. We value the contributions from our public advisors and are pleased that they have found the experience of working in CLAHRC WM enjoyable and rewarding. One public advisor commented: "*Working together with researchers to produce a study which is directed at patient benefit has been both challenging and exciting.*"

Governance:

Our public advisors met four times as the Public Advisory Committee during 2018-19 and all meetings included an opportunity to engage with our Director. A key focus for meetings was development of the proposed NIHR ARC application, and several advisors took part in 'Dragons' Den' events, where potential research themes/projects were discussed. We have two public advisors represented on CLAHRC WM's Steering Committee and Executive Committee, while PPI/E is a standing agenda item at all CLAHRC WM meetings and detailed reports update Committee members on progress in public involvement/engagement activities. Contributions from public advisors are reported in the minutes.

NIHR Standards for Involvement:

CLAHRC WM registered as a 'freestyler' to implement the NIHR '*Public Involvement Standards*' and we provided feedback on our experiences to the NIHR and to CLAHRC WM Steering Committee. Examples of how the standards have been used to enhance public involvement include the creation of a standardised template to advertise opportunities for involvement on our website (Inclusive Opportunities); and regular feedback sent to and gathered from advisors (Communications).

Activities / Outcomes:

We continue to develop innovative ways of engaging different audiences in the methods of Applied Health Research. Our 'Masterclass' to college students on '*Reading between the (Head)lines*' helped students understand concepts such as 'causation versus correlation' and 'regression to the mean'. Further, Dr Celia Brown tackled issues such as 'absolute risk versus relative risk' to a young audience as part of the University of Warwick's Christmas Lectures.

Partnerships / Collaborations:

We work closely with regional/national partners. Our PPI/E Lead is Chair of the Public involvement and Lay Accountability in Research (PILAR) network, which brings together organisations in the West Midlands who are involving the public in research. A particular success has been partnership-working with regional NIHR partners in PILAR to develop and deliver training in public involvement, and engaging the public with research (see below). Our PPI/E Lead attends the CLAHRC Public Involvement Leads meetings and is also a member of NIHR INVOLVE's Learning and Development group, which developed the new learning and development platform.

Examples of Impact:

Researchers and public contributors are encouraged to continually reflect on the impact of involvement and assess whether intended outcomes of involvement are achieved. GRIPP2, the guidance for reporting public involvement in research, is used to report involvement activities. Prof. Sophie Staniszewska has been leading work to develop GRIPP2 guidance, with a workshop held in November 2018 to explore public views on what should be reported.

Our '*Yoga for Bump*' initiative, funded through a Wellcome Trust engagement fund, has been a particular success. This project involved and engaged women from two diverse Birmingham communities (Hall Green and Perry Barr) in maternity-related research, with sessions with researchers linked to free yoga sessions. This has led to new links in our local communities and has encouraged different approaches to involvement with pregnant women, a group often under-represented in research due to practical/logistical issues in organising activities.

Communicating awareness:

Our website has Plain English Summaries of research and our public contributors continue to help develop our CLAHRC BITES, ensuring clear language and formatting. Our community, including members of the public, are invited to subscribe to our fortnightly News Blog, for which our PPI/E Lead is a frequent contributor with regional/national PPI updates.

Through PILAR we have planned and supported regional events with our NIHR partners to engage and involve wider communities in our research. These include '*Research Changes Lives*' events in Birmingham's Central Library and Pannel Croft Village.

Matched Funding Overview:

Matched funding has been one of our main areas of activity through 2018/19. We have dedicated significant time and resources to engagement with our NHS and social care partners in the formulation of our application to host an NIHR Applied Research Collaboration (ARC). This has meant two significant strands of activity: firstly reaching out to new organisations that we felt could add value and strength to our proposed areas of work; and secondly, testing potential proposals for research projects with new and existing health and social care organisations. In reaching out to our new partners we were pleased to be able to successfully engage with NHS organisations with whom we have previously had limited or no contact. This included incorporating our first GP Federation and engaging with the ambulance service for the region, as well as widening our involvement with Local Authorities. Despite, or perhaps indeed because of, the challenges faced within health and social care, we were encouraged by the huge engagement and enthusiasm there was around a further programme of applied health research within the region from both new and existing partner organisations. We were therefore pleased to be able to propose £3.39 million in NHS and social care co-funding for year 1 of our proposed ARC.

Despite the financial pressures within the health and social care sector, we have been able to achieve a matched funding amount of £4,597,980 for 2018/19. This represents an increase of over £105,000 against the predicted quantum of matched funding, with broadly the expected level of research matched funding and the over-performance being delivered through implementation matched funding. Within the context of the lifespan of CLAHRC WM, the matched funding performance this year is lower than previous years (£4.77 million in 2016/17 and £4.89 million in 2017/18) due to CLAHRC WM ending in September 2019 and projects reaching their conclusions.

One area of increased matched funding has been around engagement with a new group of staff regarding capacity building and quality improvement. The Clinical Decision Unit at UHB, our host NHS Trust, is the busiest and one of the most pressured wards in the hospital. There is constant innovation to deal with the ever increasing demand, but traditionally there has been little or no evaluation associated with this. The unit has established a Research and Quality Improvement Group supported by one of our academics and our Head of Programmes (Engagement). The aim is to promote and increase research, evaluate and publish service change, develop capacity, and improve recruitment and retention of staff in one of the most demanding areas of work (see also page 33).

Our rapid response research project using behavioural science 'nudges' to increase uptake of the annual influenza vaccine amongst frontline staff at UHB (see also page 34) leveraged additional matched funding to oversee the randomisation and delivery of the intervention to over 8000 staff. This project nicely illustrates how the academic strengths that have seen us successfully become part of the new NIHR Policy Research Unit on behavioural science (Theme 5) could be combined with our methodological strengths (Theme 6) to rapidly randomise staff to four separate arms of the study and rapidly evaluate data, whilst leveraging matched funds from a large NHS provider to deliver the intervention and collect data.

We have continued to work to improve the uptake of Statistical Process Control (SPC) charts (see also page 35). Locally we have struggled to effect changes in Board reporting, and so are working on two additional pieces of research to better understand the barriers to implementation. However, at national level the work undertaken by NHS Improvement (NHSI) has been incredibly successful, with 30 Boards now using SPC methodology within their reports and the '*Making Data Count*' publication being the most downloaded document from the NHSI website. The programme, which was in part based on our research findings in BMJ Quality and Safety, has also attracted international interest from Canada and New Zealand. We have also begun delivering workshops on SPC charts. This will now also be supported and accelerated through support from the WMAHSN.

During the course of 2018/19 we have broadened and deepened our links to both public health and social care networks. We are working with the WMAHSN and the Association of Directors of Adult Social Services to determine operational and research priorities, and have joined the Public Health England Workforce Programme Board for the region to gain greater strategic oversight of their work programmes and to explore new opportunities for joint working.

Training Overview:

As we enter the final few months of CLAHRC WM, the training that has characterised the last five years is now bearing fruit – postgraduates are completing their courses and new students have become embedded. Capacity and skills have developed to increase our impact.

Development of staff:

We have continued our beneficial collaboration with the WMAHSN and West Midlands Patient Safety Collaborative (WMPSC) allowing staff to access a variety of training packages beyond that which we could feasibly offer. WMPSC provides ongoing support for teams in the West Midlands who have introduced the Learning from Excellence (LfE) approach to further develop and embed the technique (appreciative inquiry training), a direct result of our collaboration. The second LfE conference in November 2018 was attended by over 350 delegates, and led to the model being promulgated in the Netherlands, while the researcher who worked on the project was awarded a PhD studentship to examine the appreciative enquiry technique in low- and middle-income countries. This demonstrates our ability to develop and disseminate a technique that has a direct benefit to patient safety, as well as enabling capacity development through academic study.

We have continued to make use of our Leadership and Diffusion Fellows, who are embedded in NHS institutions across the region and who can provide practical support within the working environment. These individuals are often able to provide advice tailored to local settings and are available for any follow-up queries or issues that arise.

Patient safety is also central to the Birmingham Symptom specific Obstetric Triage System (BSOTS), which is establishing itself as a significant development in the area. It has been rolled out to additional maternity units and Prof. Kenyon and Dr Johns have trained teams from 12 maternity units, three of which have implemented the system successfully, with the others in the process of doing so. A further four are booked on training and 11 are interested in the system. As the pace of adoption continues to gather, we are working with the AHSNs to increase national impact and implementation.

The work on Statistical Process Control charts has been an ongoing training priority for CLAHRC WM (see page 35). Workshops have been delivered to 60 middle and senior managers through two sessions at UHB; there are plans to roll this out across the region and a further two sessions are already booked. WMAHSN will be supporting this work, which will considerably aid its rapid dissemination. The training session will also be extended to the Clinical Academic Internship Programme (CAIP) for the region funded by Health Education England, further widening the reach of this important research implementation.

We have also expanded the Place of Birth Discussion training: following the success of the sessions, an online learning package has been developed, which is widely available to midwives as a low-cost, simple and highly effective mechanism to provide choice for pregnant women.

The Obstetric Anal Sphincter Injuries (OASIS) (page 11) project led to the establishment of the Specialist Perineal Midwife Group (reported 2017-18), which continues to thrive and has expanded to include obstetricians and physiotherapists from across the UK, not just midwives. The connection with Spain has also been maintained. This group has become multi-disciplinary, establishing an annual conference to discuss service provision and share best practice, and has attracted two industry sponsors.

The Research Midwives Forum continues to meet twice a year to share and develop best practice across the West Midlands and is attended by the local CRN.

Training and capacity-building for public involvement in research continues under the direction of our PPI/E Lead who maintains an ‘open door’ policy for researchers and members of the public interested in PPI. As a result of demand, monthly drop-in sessions will increase to twice-monthly from April 2019. The PPI/E Lead has also developed a series of ‘Quick Guides’ for researchers on topics relating to public involvement that reference the NIHR Public Involvement Standards and cover commonly-asked questions, with links to local processes and further resources. Several formal teaching sessions have been given to students on teaching programmes at the University of Birmingham (MSc Public Health, CAIP, and MSc Advanced Clinical Practice).

PPI training has also been delivered in collaboration with our host trust, UHB, as well as NIHR BRC and SRMC Centres to develop two workshops, ‘*First Principles of PPI*’ and ‘*Setting up a PPI group*’. These were delivered three times during 2018 with a total of 68 delegates attending (57 researchers and 11 public contributors). A programme for further development and delivery is planned for 2019.

Particular strengths of the training environment:

We have a particular strength in ensuring that research developments are translated into practical training so that the knowledge is disseminated and practice improved. A good example of this is the STarTBack programme: a new website was launched in November 2018 to provide information and download of the tool, as well as a one-day training session. This initiative provides both a location for resources to be disseminated and managed, and focussed training that will not take up too much time for busy clinicians. Meanwhile, an option for more in-

depth training is also provided, with a four-day course, "*Biopsychosocial Management of Complex Patients with Low Back Pain*". Over 300 physiotherapists have now received the training, and 99% of attendees would recommend the course to others, while rating the course as either 'good', 'very good' or 'excellent'. International training programmes have been delivered to clinicians in Norway, Belgium, Ireland, the USA and Denmark. The approach has been included in the Royal College of General Practice Curriculum and has been included in four modules.

Aside from training that is particular to individual research projects, we maintain our links with topical seminar series related to each Theme. The Programme Steering Committee meetings include an hour for a research topic to be presented, with ample time for questions and discussion afterwards so that researchers at all levels can gain useful insight from across our Themes within a supportive environment.

The CLAHRC Head of Programme Delivery (Engagement) continues to deliver lectures for the MSc in Healthcare Policy and Management and for the Masters in Public Health at the University of Birmingham.

The embedded posts described above provide a valuable link for researchers and clinicians based largely in a non-academic environment: the three posts at University Hospitals Birmingham and Heart of England Foundation Trust; the GP post at University Hospitals Coventry and Warwickshire; and a post at Sandwell and West Birmingham, plus two GP posts based at Keele University have been a particular CLAHRC WM success, supporting research awareness and development of staff who may have little time or resource available to them.

Prof. Sara Kenyon continues to be an NIHR Advocate for Career Development in Midwifery and has been appointed as Deputy Chair of HEE/NIHR Integrated Clinical Academic Programme Pre-doctoral Clinical Academic Fellowship Scheme Panel. She is currently supervising a successful PCAF student. Prof. Nadine Foster is an NIHR Advocate for Career Development in Physiotherapy and continues to support practitioners developing research capability in this area

Ensuring that research student / support staff receive a high quality development experience:

This year, nine postgraduates have completed their PhDs, with a further seven in the latter stages of awaiting their viva or submitting final corrections and 17 students writing up their theses. Many PhD students completed during the previous reporting cycle but we continue to provide a rich source of projects and data for postgraduates. A further 17 students are still in the phase of data collection and analysis. Follow-up information was available for seven of the awarded postgraduates and they all continued in academic, combined academic and clinical posts or a related medical area, demonstrating that the research environment has built sufficient confidence that they were able to begin careers in their respective fields. Students are all embedded within their research areas, with access to local seminar and research programmes, as well as having the facility to present to all our Themes during the dedicated research slot in the Programme Steering Committee.

This year we were again successful in having an NIHR Short Placement Award for Research Collaboration awarded to a postgraduate who will complete training on Advanced Skills in Systematic Reviewing and Evidence Synthesis at CLAHRC North West Coast in the Improving Mental Health Theme. While we did not have any applicants for the NIHR Summer Training Camp this year, this appears to be related to the fact that our students are either in the final stages of their PhDs or not sufficiently advanced that the training camp would be beneficial.

The PPI/E Lead, together with one of our PPI Advisors, have developed and delivered training to assist researchers at the University of Birmingham who are considering applying for an NIHR Fellowship. Whilst many researchers have some experience of public involvement in research, many have not planned or coordinated public involvement activities, so the workshop covers the basics of public involvement in addition to practical tips and guidance on involving the public in research. Those in attendance are invited to 'pitch' ideas to public contributors in a friendly 'Dragons' Den' where they can get feedback on the relevance of their research idea and plans to involve members of the public.

The WBS Organising Healthcare Research Network continues to offer support to both students and early career researchers where they can present research locally, as well as submit an application for financial assistance to attend a subject-related conference. A recent Warwick Medical School Distinguished Lecture given by a speaker invited by our Director on '*The research dividend: how academic research can improve clinical care net of the scientific findings of that research*' was well-attended by our postgraduates and researchers. This had particular relevance as CLAHRC WM draws to a close and many projects are concluding.

Overall training costs are not easy to estimate due to each theme managing their own resources and cross-over encouraged. There are currently 17 students in Years 1, 2 or 3; with an average annual cost per person of £20,000 (including fees and stipend), this would indicate an overall annual cost of £340,000, although this total would comprise a range of sources.

The Training Lead for CLAHRC WM is Dr Anne-Marie Brennan.

Links with NIHR:

Our Head of Programmes (Engagement) continues to maintain a base embedded within the Institute for Translational Medicine (ITM) at UHB, our NHS host Trust. This allows us to be co-located with a host of NIHR infrastructure including the NIHR Biomedical Research Centre, NIHR Clinical Research Facility, NIHR Surgical Reconstruction and Microbiology Research Centre, and the NIHR Trauma Medtech and In vitro Diagnostic Collaboration (Trauma MIC). It also means we are closely located with offices of the West Midlands Clinical Research Network (WM CRN) and NIHR Research Design Service in Birmingham. It also co-locates us with the West Midlands Academic Health Science Network (WMAHSN), which has been crucial to our close collaboration, along with key commercialisation partners, such as MidTech and Medilink West Midlands. Our CLAHRC WM Director sits on the board of both the Trauma MIC and WMAHSN to foster closer collaboration, and our Head of Programmes engages with interface between the WMAHSN and health and social care providers through attendance at the WMAHSN Membership Innovation Councils, which link to the six Sustainability and Transformation Partnerships (STPs) within our region. Our PPI/E Lead from CLAHRC WM has been asked to chair our Public Involvement and Lay Accountability in Research (PILAR) group that brings together representatives from all our NIHR infrastructure for the region. We are engaging and working with the newly established Midlands Health Alliance, which is working to facilitate increased collaboration across 11 elements of NIHR infrastructure in the East and West Midlands to produce a comprehensive research offering.

The first paper has now been published as part of collaboration with NIHR CLAHRC East Midlands on health informatics and database studies. A further two papers will be submitted in early 2019, with three more studies in progress and two others in set up. Our work looking at adoption and uptake of evidence from the Health Technology Assessment programme continues, with our first paper focussing on developments in trauma and orthopaedics care submitted for publication, and a further piece of supporting qualitative research planned. Some of the results are inconclusive, hence the need for qualitative work to better understand their context, but we continue to work with the NIHR National Evaluation, Trials and Studies Coordinating Centre (NETSCC) and the NIHR Dissemination Centre to look at how these could influence future research and findings. This has also led to us working with the NHS Business Services Authority to gain access to new data sets such as equipment purchases.

We continue to work with the WM CRN where we are part of the Health Services and Delivery Research group for the region, and we have built links to the their Enabling Research in Care Homes (ENRICH) group as our engagement in this sector increases.

We are working with Health Data Research UK with the aim of developing a Programme Grant for Applied Research application for a novel project using artificial intelligence to detect, risk-stratify and develop new ways to manage patients with inherited heart conditions. This will incorporate other strands of our existing work, such as video outpatient consultations, and will hopefully change the outpatients model needed to manage these patients.

Some our academics based within our Implementation and Organisational Science theme, 5 at Warwick Business School were successful as part of the group who obtained a NIHR Policy Research Unit on behavioural science. With an increasing interest in social care research we have also worked to build links with both the NIHR School for Social Care Research team at the University of Birmingham and the newly-established Centre for Health and Social Care Leadership there.

Research from our team in Keele University was featured as part of the NIHR Dissemination Centre themed review "*Moving Forward: Physiotherapy for Musculoskeletal Health and Wellbeing*" (July 2018). In addition, NIHR Signals were produced from our research into tonsillectomy in children (pages 20-21) and the RESPITE study on pain relief during labour (page 12).

Our relationship with the WMAHSN continues to mature. Their re-licensing process has provided an opportunity to review our partnership working and develop our offer to the region. We are delighted the new 'patient safety service' (see top achievement 3, page 6) will consist of four programmes, each underpinned by CLAHRC WM evaluation. These will be supported for implementation across all of the health and social care organisations within the region through the six STPs and the WMAHSN Membership Innovation Councils at which we are a member. Should we be successful in our application for an NIHR ARC we have exciting plans to develop this relationship further, using their network of implementation fellows (one per STP), and with a joint funded post to develop health economics, which we know is a significant skill gap for both industry engagement and for the workforce more widely. The WMAHSN have launched Digital Health West Midlands programme to tackle the gaps in digital and data knowledge within the region, which we will be supporting (see also page 32).

Industry Strategy Update:

One of the pillars of our Industry Strategy was to assist professional services firms in dealings with the NHS. We have delivered well on this aim, working with five of the biggest professional services firms. We identified a significant need within our region for rigorous evaluation of service changes delivered in a short time-frame, and so developed the idea of 'rapid response research' (see page 34). Our strategy has been key in reassessing traditional approaches to research, challenging existing practise, and creating new approaches to inform future proposals.

Another main objective was to align with the WMAHSN, ensuring a more integrated and seamless approach to industry engagement within the region, and creating a single point of entry for industry engagement. We are thus involved in many activities that would otherwise be difficult to access, while feedback from companies demonstrates they value the opportunities and ease to engage with academia. Together we have produced 118 new projects.

Our Industry Strategy now needs refreshing due to a number of new strategic drivers. Firstly, the publication of '*Building a Britain Fit for the Future*', the government's industrial strategy paper, draws our focus towards four challenges: AI and Data Economy; Future of Mobility; Clean Growth; and Ageing Society. Whilst these are not all explicitly linked to health, much of the content of the strategy impacts on delivery of health and social care when considering a wider remit. Secondly, the publication of the NHS Long Term Plan developed the four challenges into more granular objectives for health, with a strong focus on digitally enabled care. Potentially this will require greater engagement with industry to solve some of the many challenges that exist around access and intra-operability. Thirdly, the WMAHSN have recently reviewed their structures and objectives after their successful re-licensing, and we are therefore working closely to ensure that our strategies, plans and themes are closely aligned. Finally, applying for a proposed NIHR Applied Research Centre (ARC) has led us to review our themes, projects and stakeholders in light of the changing and operational environment, meaning a new strategy and plan would be required. If successful with our proposal we aim to produce a new industrial strategy and delivery plan within the first six months.

Specific Progress:

There have been fewer industry contacts this year due to a shift of focus towards engagement with the NHS and social care, and generation of new research ideas for our ARC application. As CLAHRC WM ends our efforts have focussed more on supporting existing relationships rather than generating new ones. Even so, we have worked with eight industry partners at both detailed and strategic level over the past year.

For instance, our presentation at an industry engagement event led to contact from a local company specialising in human factors training who are developing a digital training tool that they wish to evaluate for the health care sector. Having previously operated within aviation and engineering they were finding the health sector difficult to navigate or meaningfully engage with. Following several meetings with them to better understand their needs and product, we were able to put them in contact with the West Midlands Patient Safety Collaborative who have already developed human factors training programmes within health so they can collaborate on future projects.

We continue to provide ad hoc advice, information and signposting to a range of SME-focussed agencies, including the WMAHSN, MidTech and Medilink West Midlands. For example, the ITM engaged with 136 companies in the last six months.

Our independent evaluation of the Virginia Mason Institute programme, which has been implemented in five NHS hospitals, is now underway. This should provide valuable findings in relation to leadership in driving and sustaining change, and a greater understanding in continuous improvement. This is funded by the Health Foundation, and whilst it is not due to report its findings until 2021, the design of the study means findings will be shared with the participating trusts throughout the life cycle of the study. Further, lessons learned around these topics, and implementation more generally, will be shared with, and disseminated to, the NHS. We have also received new grants that have commenced during 2018/19 from Arthritis Research UK, Macmillan Cancer Support, the Health Foundation and British Academy.

We continue to collaborate with industrial partners, including Pfizer, IBM, GE Healthcare, KPMG (see page 28); as well as the Association of British Pharmaceutical Industry through our involvement with the WMAHSN. Adoption of the STarTBack model continues to expand (pages 40-41), with 48 licence agreements in place; while we have renewed or issued new licence agreements to 19 Trusts for training materials relating to the Place of Birth and Birmingham Symptom-specifc Obstetric Triage System (page 10). Whilst there is no commercial income from these licences, the fact that there is no cost barrier to implementation has helped support the rapid roll out of BSOTS, which we anticipate will accelerate during 2019/20, particularly as we have now obtained additional support and investment for implementation from WMAHSN. In total we have signed 23 licence agreements during 2018-19.

Theme 1: Maternity and Child Health

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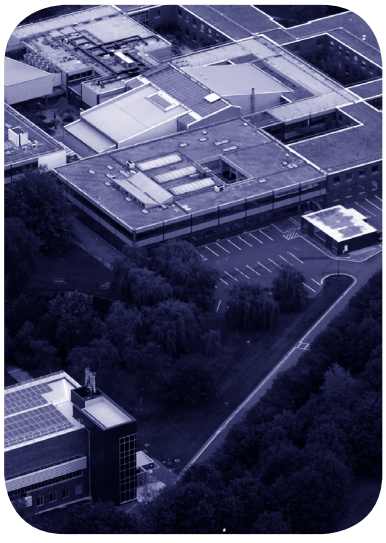

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